

CLAIMS

What is claimed is:

1. An integrated circuit on a line card in a router, the line card having a first interface through which the line card is couplable to either a cell network or a packet network, the line card having a second interface through which the line card is coupled to a switch fabric of the router, the integrated circuit being configurable:

in a first way such that the line card receives data in cell format from the cell network via the first interface, the data passes through the integrated circuit, and the line card outputs said data in cell format via the second interface to the switch fabric;

in a second way such that the line card receives data in packet format from the packet network via the first interface, the data passes through the integrated circuit, and the line card outputs said data in cell format via the second interface to the switch fabric;

in a third way such that the line card receives data in cell format via the second interface, the data passes through the integrated circuit, and the line card outputs said data in cell format via the first interface to the cell network; and

in a fourth way such that the line card receives data in cell format via the second interface, the data passes through the integrated circuit, and the line card outputs said data in packet format via the first interface to the packet network.

2. The integrated circuit of Claim 1, wherein the data in the cell format represents first data contained within cells of a fixed size when the first data belongs to a first flow, and wherein the data in the packet format represents second data contained in variable size packets when the second data belongs to a second flow.

3. The integrated circuit of Claim 1, wherein the router is one of an ATM switch that redirects ATM cells from one network to another network.

1 4. The integrated circuit of Claim 1, wherein the router is an IP router that redirects IP
2 packets from one network to another network.

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4 5. The integrated circuit of Claim 1, wherein both a first flow of cell format data and
5 a second flow of packet format data are received onto the line card via one
6 wavelength band in a fiber optic cable, the integrated circuit being configured in the
7 first way so the first flow of cell format data passes through the integrated circuit and
8 to the switch fabric, the integrated circuit being configured in the second way so that
9 the second flow of packet format data passes through the integrated circuit and to the
10 switch fabric.

11
12 6. An integrated circuit on a line card in a router, the line card having a first interface
13 through which the line card is couplable to either a cell network or a packet network,
14 the line card having a second interface through which the line card is coupled to a
15 switch fabric of the router, the integrated circuit being configurable:

16 in a first way such that the line card receives data in cell format from the cell
17 network via the first interface, the data passes through the integrated circuit, and the
18 line card outputs said data in cell format via the second interface to the switch fabric;
19 and

20 in a second way such that the line card receives data in packet format from the
21 packet network via the first interface, the data passes through the integrated circuit,
22 and the line card outputs said data in cell format via the second interface to the switch
23 fabric.

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25 7. An integrated circuit on a line card in a router, the line card having a first interface
26 through which the line card is couplable to either a cell network or a packet network,
27 the line card having a second interface through which the line card is coupled to a
28 switch fabric of the router, the integrated circuit being configurable:

29 in a first way such that the line card receives data in cell format via the second
30 interface, the data passes through the integrated circuit, and the line card outputs said
31 data in cell format via the first interface to the cell network; and

1 in a second way such that the line card receives data in cell format via the second
2 interface, the data passes through the integrated circuit, and the line card outputs said
3 data in packet format via the first interface to the packet network.

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5 8. An integrated circuit on a line card in a router, the line card having a first interface
6 through which the line card is couplable to either a cell network or a packet network,
7 the line card having a second interface through which the line card is coupled to a
8 switch fabric of the router, the integrated circuit being configurable:

9 in a first way such that the line card receives data in cell format from the cell
10 network via the first interface, the data passes through the integrated circuit, and the
11 line card outputs said data in packet format via the second interface to the switch
12 fabric;

13 in a second way such that the line card receives data in packet format from the
14 packet network via the first interface, the data passes through the integrated circuit,
15 and the line card outputs said data in packet format via the second interface to the
16 switch fabric;

17 in a third way such that the line card receives data in packet format via the second
18 interface, the data passes through the integrated circuit, and the line card outputs said
19 data in cell format via the first interface to the cell network; and

20 in a fourth way such that the line card receives data in packet format via the
21 second interface, the data passes through the integrated circuit, and the line card
22 outputs said data in packet format via the first interface to the packet network.

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24 9. An integrated circuit on a line card in a router, the line card having a first interface
25 through which the line card is couplable to either a cell network or a packet network,
26 the line card having a second interface through which the line card is coupled to a
27 switch fabric of the router, the integrated circuit being configurable:

28 in a first way such that the line card receives data in cell format from the cell
29 network via the first interface, the data passes through the integrated circuit, and the
30 line card outputs said data in packet format via the second interface to the switch
31 fabric; and

1 in a second way such that the line card receives data in packet format from the
2 packet network via the first interface, the data passes through the integrated circuit,
3 and the line card outputs said data in packet format via the second interface to the
4 switch fabric.

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6 10. An integrated circuit on a line card in a router, the line card having a first
7 interface through which the line card is couplable to either a cell network or a packet
8 network, the line card having a second interface through which the line card is
9 coupled to a switch fabric of the router, the integrated circuit being configurable:

10 in a first way such that the line card receives data in packet format via the second
11 interface, the data passes through the integrated circuit, and the line card outputs said
12 data in cell format via the first interface to the cell network; and

13 in a second way such that the line card receives data in packet format via the
14 second interface, the data passes through the integrated circuit, and the line card
15 outputs said data in packet format via the first interface to the packet network.

16
17 11. An integrated circuit on a line card in a router, the integrated circuit comprising a
18 lookup engine, a segmentation engine, and a reassembly engine, the lookup engine
19 being usable to analyze a flow of incoming network information and to output an
20 identifying flow number therefore, the segmentation engine being usable to segment a
21 large block of data into a plurality of smaller blocks of data, the segmentation engine
22 temporarily storing the smaller blocks of data, the reassembly engine being usable to
23 reassemble a plurality of smaller blocks of data into a larger block of data, wherein
24 the integrated circuit is configurable:

25 in a first configuration as an ingress integrated circuit to receive data in cell
26 format and to output to a switch fabric of the router said data in packet format;

27 in a second configuration as an ingress integrated circuit to receive data in packet
28 format and to output to the switch fabric of the router said data in packet format;

29 in a third configuration as an egress integrated circuit to receive data in packet
30 format from the switch fabric of the router and to output to a cell network said data in
31 cell format; and

1 in a fourth configuration as an egress integrated circuit to receive data in packet
2 format from the switch fabric of the router and to output to a packet network said data
3 in packet format.

4
5 12. The integrated circuit of Claim 11, wherein the lookup engine operates to output
6 flow numbers in the first configuration and the second configuration but does not
7 output flow numbers in the third configuration and the fourth configuration.

8
9 13. The integrated circuit of Claim 11, wherein the segmentation engine operates to
10 segment a large block of data into a plurality of smaller blocks of data second
11 configuration, the third configuration, and the fourth configuration, the segmentation
12 engine not segmenting a large block of data into a plurality of smaller blocks in the
13 first configuration.

14
15 14. The integrated circuit of Claim 11, wherein the reassembly engine operates to
16 reassemble a plurality of smaller blocks of data into a larger block of data in the first
17 configuration, the second configuration, and the fourth configuration, the reassembly
18 engine not reassembling a plurality of smaller blocks of data into a large block of data
19 in the third configuration.

20
21 15. The integrated circuit of Claim 11, wherein the lookup engine is usable to output
22 identifying flow numbers for ATM flows.

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24 16. The integrated circuit of Claim 11, wherein the lookup engine is usable to output
25 identifying flow numbers for MPLS flows.

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27 17. The integrated circuit of Claim 11, wherein the lookup engine is usable to output
28 identifying flow numbers for frame relay flows.

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30 18. The integrated circuit of Claim 11, wherein the integrated circuit has a first
31 interface through which the integrated circuit is coupled to a network, the first

1 interface having a plurality of logical ports such that each flow is received onto or is
2 transmitted from the integrated circuit via one and only one port, the flows on each
3 port being of only one service type.

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5 19. The integrated circuit of Claim 18, wherein the lookup engine being usable to
6 analyze flows of incoming network information by identifying a port for a flow and
7 then based on the port identified looking up the service type of the flow.

8
9 20. The integrated circuit of Claim 11, wherein the each of the smaller blocks of data
10 generated by the segmentation engine is temporarily stored in a memory and wherein
11 a pointer is generated for each smaller block of data that identifies where in the
12 memory the smaller block of data is located, and wherein the reassembly engine does
13 not read the smaller blocks of data out of the memory and reassemble them and then
14 store them in reassembled format prior to the smaller blocks being output from the
15 integrated circuit but rather the smaller blocks of data are output from the integrated
16 circuit smaller block by smaller block, the pointers being used to identify where in
17 memory each smaller block being output is located.

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19 21. The integrated circuit of Claim 1, wherein the integrated circuit further comprises
20 a per flow queue, a scheduler, and a memory manager.
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